

ment and to Dr. A. N. Henry, Regional Botanist, Southern Circle, Botanical Survey of India, Coimbatore for helpful suggestions and discussion.

DESCRIPTION OF A NEW GENUS AND SOME NEW SPECIES OF TORRENTICOLE DIPTERA OF THE NORTHWEST HIMALAYA<sup>1</sup>

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(With thirty-four text-figures)

*Beasomia sexdecima*, gen. et sp. nov. (Diptera: Psychodidae) and *Blepharocera alhnicola* sp. nov. and *B. rahlaea* sp. nov. (Diptera: Blepharoceridae) are described. The type specimens are deposited in the collection of the School of Entomology, St. John's College, Agra, U.P. India for onward transmission to Zoological Survey of India, Calcutta.

Genus **Beasomia** gen. nov.

MALE: Head transverse oval; antenna with 15 segments; first segment cordately oval with dense lamellae of long setae, third segment with a ventral pectinal brush of short conspicuous row of setae and two modified apical spines; flagellar segments without 'S' shaped chaetae. Palpus four segmented nearly equal to the length of antenna. Third longitudinal vein ending below wing tip; tip of wing pointed. Rs with four branches; distal part of Cu elongate. Sc reduced, wing base normal not disproportionately rounded or distended. Genitalia with three pairs of appendages. Female antenna 16 segmented. The affinity of this new genus to other known genera is shown in the following key.

Subfamily PSYCHODINAE

KEY TO GENERA MODIFIED FROM BRUNETTI (BRUNETTI 1912)

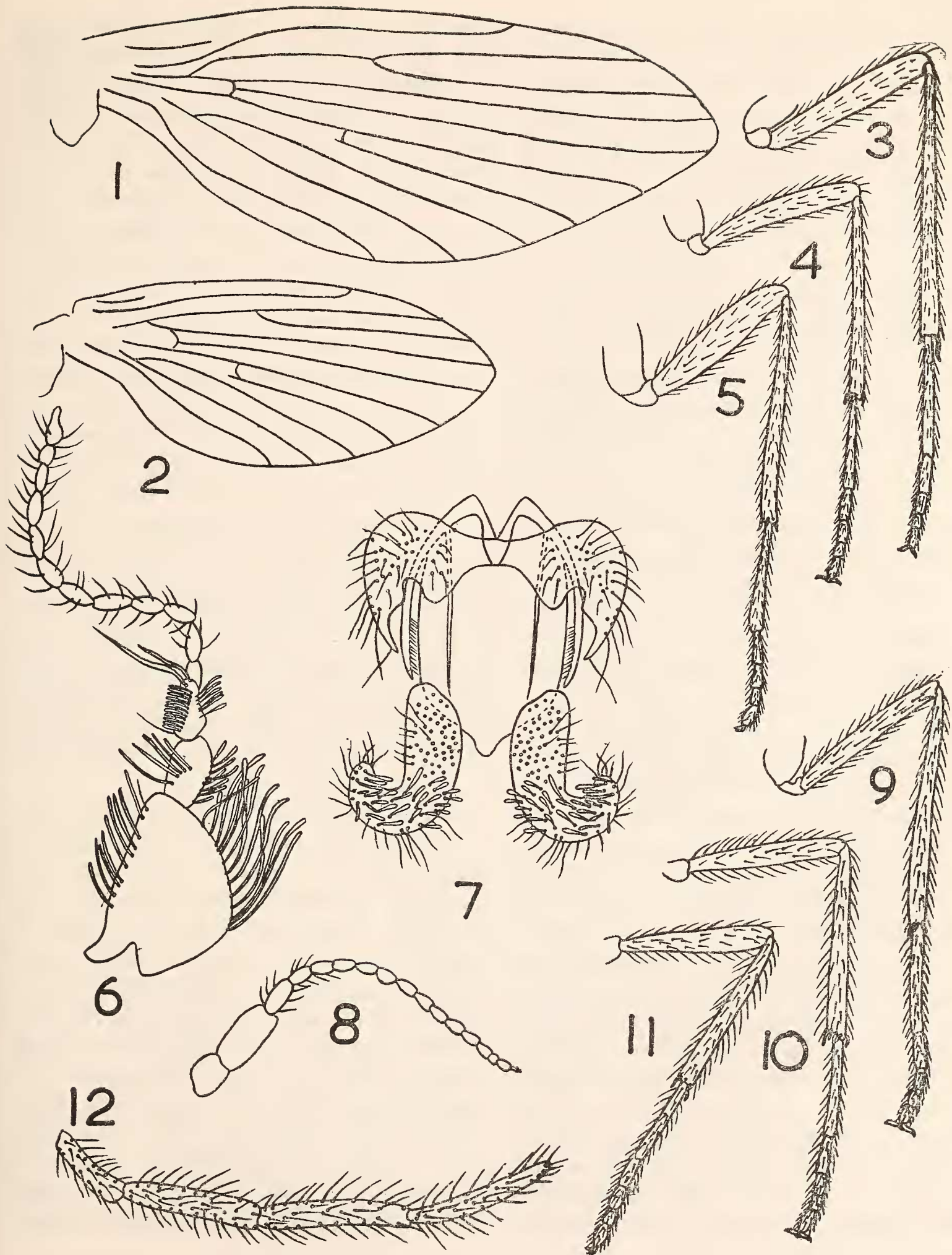
- 1. The third longitudinal vein ending exactly at the wing tip .....2

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- The third longitudinal vein ending just below the wing tip .....3
- 2. Membrane of wing never considerably covered with scales, these being confined to small wing spots. Flagellar joints of antennae without conspicuous 'S' shaped chaetae. Male genitalia with two pairs of appendages.....*Psychoda* Latr. Membrane of wing with considerable areas covered with scales. Flagellar joints of antennae with distinct 'S' shaped chaetae. Male genitalia with three pairs of appendages.....*Parabrunettia* Brun.
- 3. Anterior basal angle of wing not abnormally extended, flagellar joints of antennae without or inconspicuous 'S' shaped chaetae. Male genitalia with two pairs of appendages.....*Pericoma* Walk. 'S' shaped chaetae on flagellar joints of antennae present or absent. Male genitalia with three pairs of appendages.....4
- 4. Anterior basal angle of wing very disproportionately rounded and distended, so that the auxiliary and first longitudinal veins are very much removed from the costal margin. Membrane of wing wholly covered with scales. Flagellar joints of antennae with conspicuous 'S' shaped chaetae.....*Brunettia* Ann.

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Figs. 1-12. *Beasomia sexdecima* gen. et sp. nov. ♂ ♀ : Length 2.60 mm ♂ : 3 mm ♀.  
 1. ♀ wing; 2. ♂ wing; 3. ♂ hind leg; 4. ♂ middle leg; 5. ♂ foreleg;  
 6. ♂ antenna; 7. ♂ genitalia; 8. ♀ antenna; 9. ♀ hindleg; 10. ♀ middle leg;  
 11. ♀ foreleg; 12. ♂ palpus.

Anterior basal angle of wing normal; 'S' shaped chaetae on the flagellar joints absent, instead first antennal segment clothed with dense lamellae of long setae above, the third segment bears ventrally a pectinal brush of short, conspicuous setae and apically with two elongated, flattened spines, of which one is long and other about half the first in length.....

.....*Beasomyia* gen. nov.

Type species: *Beasomia sexdecima* sp. nov.

***Beasomia sexdecima* sp. nov. (Figs. 1-12)**

MALE: Length of body, including genitalia, 2.60 mm; brown, abdomen and legs yellowish-brown, head brown, transverse oval, 1.60 times as wide as long. Antennae (Fig. 6), 2.30 as long as head and nearly equal to palpus, 15 segmented; first segment very stout, cordately oval, nearly 1.30 as long as thick, clothed with dense lamellae of long setae above; the second nearly oval 1.70 as long as thick, 0.40 times the length of the first; the third elongate, cordate, wider basally than apically, 0.90 times the second, bears ventrally a pectinate brush of short conspicuous row of setae, apically with two elongate, flattened, modified spines, of which one is long and other about 0.50 its length; fourth segment oval, 0.60 the third; segments 5 to 13 more or less oval, but gradually becoming shorter and more slender; fourteenth subglobose; terminal segment flask-shaped, with a neck as long as the enlargement. Palpus (Fig. 12), four segmented; first segment short, nearly 3 times as long as thick, second long, uniformly cylindrical, about 1.70 the first, third uniformly cylindrical, distinctly longer than the second, fourth equals the third but more slender. Legs densely setose; fore leg (Fig. 5): femur about 7 as long as thick, tibia 1.25 the femur, tip of tibia dentate and with long subacute spines; tarsus nearly equal to tibia, first tarsal segment nearly 0.50 the

tibia and 0.50 the total length of tarsus; second 0.30 the first; third 0.75 the second; fourth 0.6 the third; fifth 1.50 the fourth; claw simple, almost straight, empodium small. Middle leg (Fig. 4): femur similar to fore femur; tibia 1.25 the femur, tip of tibia dentate and with long subacute spines; tarsus nearly equal to tibia, first tarsal segment distinctly more than half the tibia, and nearly 0.60 the total length of tarsus; second 0.30 the first; third nearly 0.60 the second; fourth 0.80 the third, fifth equal to third and 1.25 the fourth; claw simple, almost straight, empodium small. Hind leg (Fig. 3): femur similar to mid femur, tibia 1.40 the femur, tip of tibia dentate and with subacute spines; tarsus 0.80 the tibia; first tarsal segment nearly 0.50 the tibia and nearly 0.60 the total length of tarsus; second 0.30 the first, third nearly 0.60 the second; fourth 0.80 the third; fifth equal to third and 1.25 the fourth; claw simple, almost straight, empodium minute. Wing (Fig. 2): 3.1 mm; 2.20 as long as wide; anterior branch of second longitudinal fork nearly at the middle; fourth longitudinal fork a little before the middle, as in figure. Genitalia (Fig. 7): with three pairs of appendages as in figure.

FEMALE: Length of body including ovipositor 3 mm. Antenna (Fig. 8), 16 segments; first segments 1.40 as long as thick, the second uniformly cylindrical, about 2 as long as thick, the third a little over half the second, the fourth 0.6 the third, fourth to fifteen almost similar, moniliform, sixteenth flask shaped, neck 0.75 the enlargement. Wing (Fig. 1): 3.8 mm; 2.7 as long as wide, rest as in male. Fore leg (Fig. 11): femur cylindrical, 7.5 as long as thick; tibia little longer than femur; tarsus a little longer than tibia, first tarsal segment about 0.50 the tibia, the second 0.36 the first, the third 0.75 the second, the fourth 0.66 the third, fifth 1.40 the fourth. Middle

leg (Fig. 10): femur a little longer than the fore femur, uniformly cylindrical, 8.0 as long as thick; tibia 1.25 femur; tarsus subequal to the tibia; first tarsal segment half the tarsus, the second about 0.40 the first, the third 0.55 the second, the fourth 0.8 the third, the fifth 1.50 the fourth, Hind leg (Fig. 9): femur distinctly longer than the midfemur, tibia 1.40 the femur; tarsus 0.85 the tibia; first tarsal segment 0.40 the tibia, the second 0.33 the first, the third 0.66 the second, the fourth 0.66 the third, the fifth 1.50 the fourth. Claw in all the legs simple and curved. Ovipositor simple, 0.33 the abdomen;

*Holotype* ♂, *allotype* ♀, dissected on slides. INDIA: *Himachal Pradesh*: Palchan (Kulu Valley), 2900 m, 4.x.1970, B. K. Kaul.

Family: BLEPHAROCERIDAE

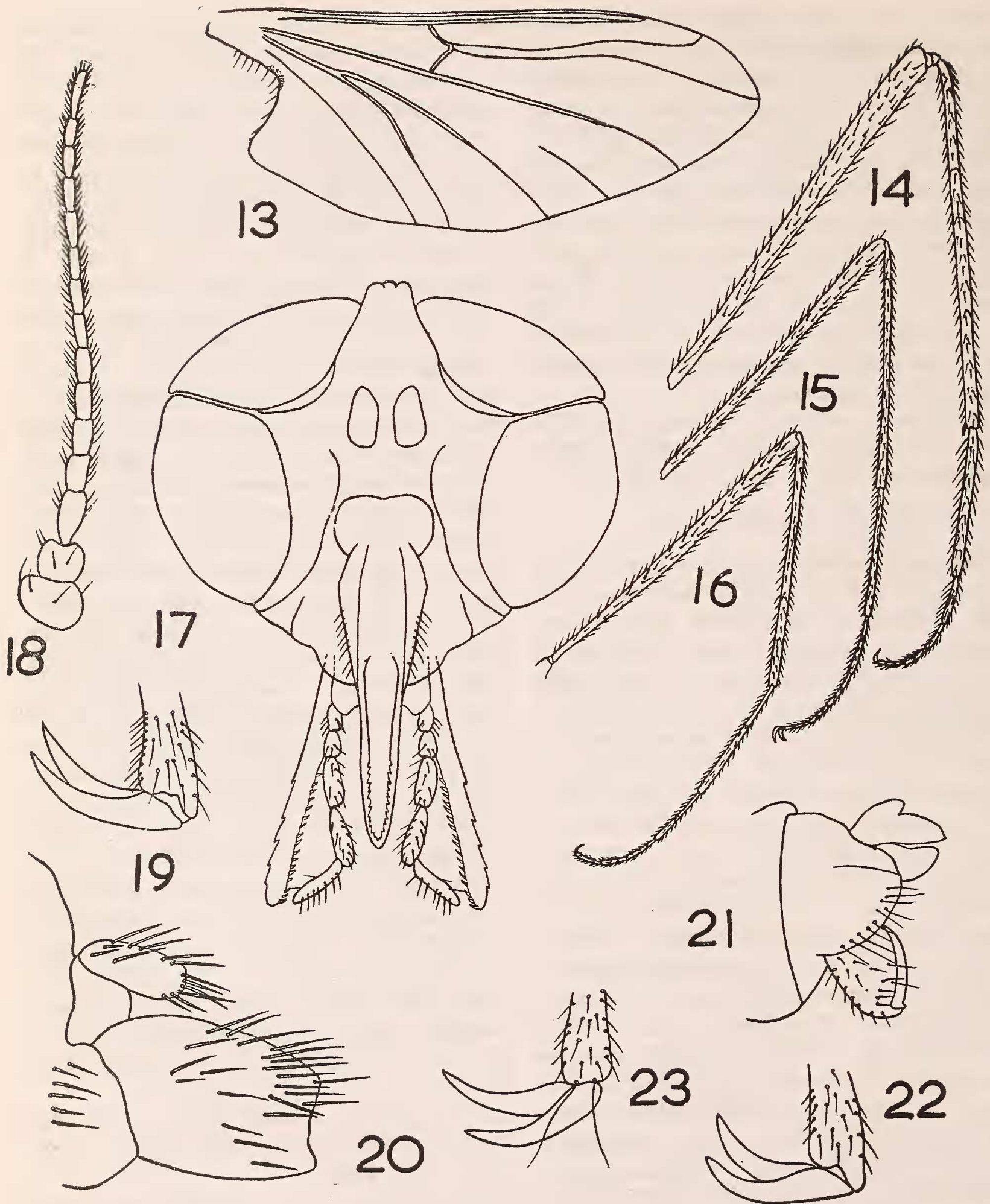
***Blepharocera alhnicola* sp. nov.** (Figs. 13-23)

FEMALE: 5.70 mm. Body dark brown dorsally, yellowish brown ventrally, legs predominantly brown, venation brown. Head viewed in front (Fig. 17) width nearly 1.15 the height (excluding rostrum) with a bunch of stout bristles between the root of antenna and the border of the ventral eye. Antenna (Fig. 18) filiform, length 1.30 times the head width, 15 segmented, first segment 1.60 as thick as long, second 0.80 the first and 1.20 as thick as long, third 1.40 the second and 2.00 as long as thick, fourth 0.70 the third, fifth 0.80 the fourth, fifth to fourteenth subequal, fifteenth 1.60 the fourteenth. Eyes densely pubescent, contiguous, transversely bisected by a moderately narrow band, dorsal eye orange, width 2.50 times the length and almost equal to the length of the ventral eye; ventral eye black, nearly 1.70 as long as wide, with more and smaller ommatidia than on the dorsal eye. Rostrum 0.83 the height of head, labrum elongate and serrate, mandibles well developed

and serrate mesially; hypopharynx serrate at the distal half; palpus (Fig. 17) clothed with spines as in figure, 5 segmented, first and second segment subequal, third 1.60 the second, fourth 1.20 the third, fifth a little longer than the fourth. Wing (Fig. 13) 6.70 mm; 2.60 as long as wide,  $R_{1+2+3}$  ending at 0.80 of the wing length,  $R_{1+2+3}-R_4$  cross vein almost equal to  $R_5-M_1$  cross-vein,  $R_4$  and  $R_5$  starting at basal 0.43 of the wing length;  $M_3$  incomplete, 0.20 the length of  $M_1$ ; Cu-An space nearly 0.40 the  $M_4$ -Cu space; anal lobe as far as 5.40 times the Cu-An space from An. Halteres nearly equal to the first two abdominal segments, stalk yellow, knob brown. Legs long and slender. Fore leg (Fig. 16): femur long; tibia 0.80 the femur; tarsus a little longer than tibia; first tarsal segment about 0.50 the tibia, second 0.50 the first, third 0.50 the second, fourth a little shorter than the third, fifth subequal to the fourth; claw (Fig. 19) slightly curved. Middle leg (Fig. 15); coxa (Fig. 20) with a spur; femur equal to forefemur; tibia 0.80 the femur; tarsus slightly longer than tibia; first tarsal segment 0.50 the tibia, second about 0.50 the first, third 0.60 the second, fourth 0.60 the third, fifth a little longer than the fourth; claw (Fig. 23) simple and slightly curved. Hind leg (Fig. 14): femur 1.33 the midfemur; tibia 0.90 the femur, tarsus a little shorter than 0.80 the tibia; first tarsal segment about 0.4 the tibia, second 0.33 the first, third 0.6 the second, fourth and fifth subequal, each a little shorter than the third; claw (Fig. 22) simple, slightly curved. Abdomen nearly 0.70 the body, ovipositor (Fig. 21) with a pair of appendages as in figure.

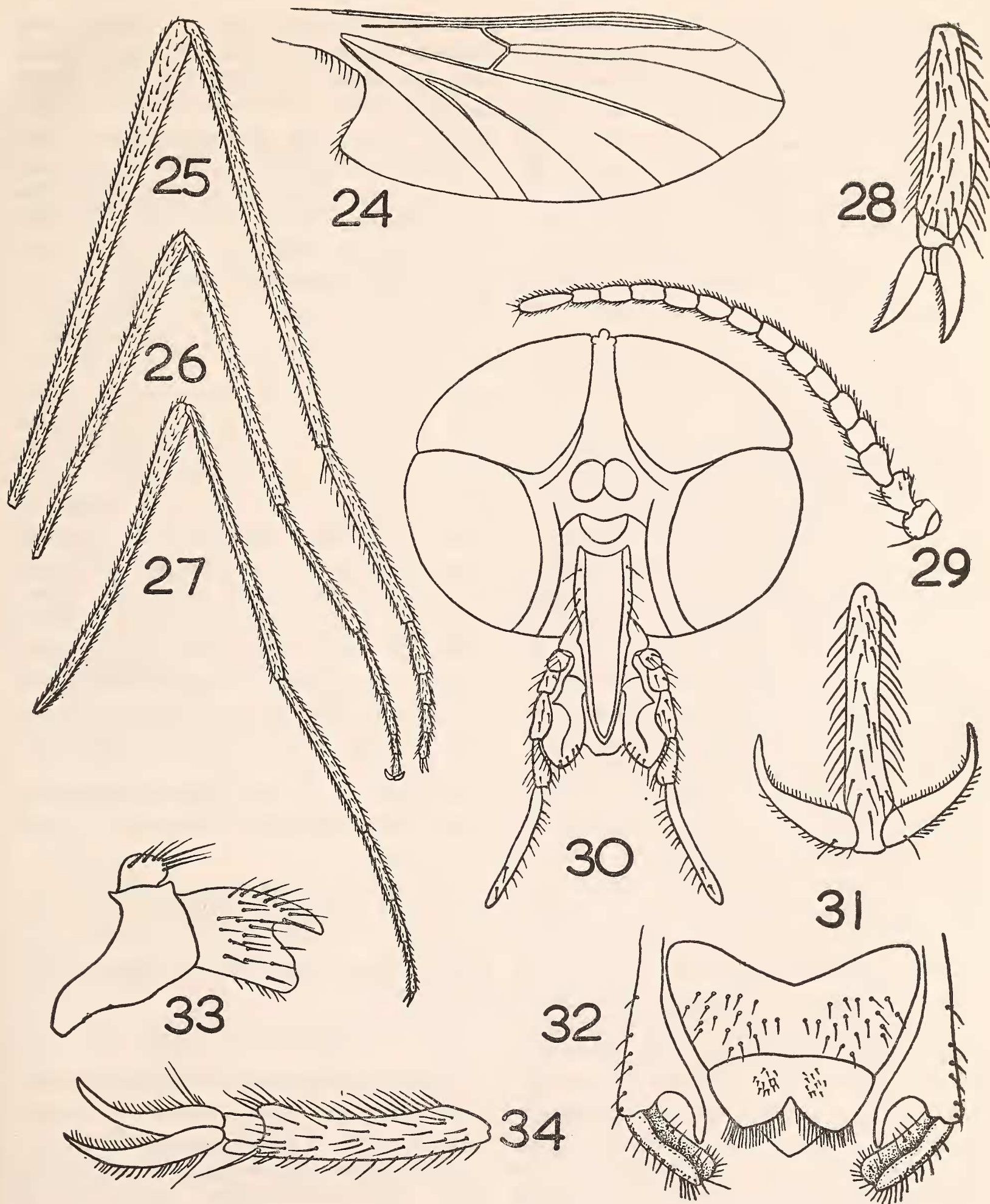
*Holotype* ♀ on slide, INDIA: *Himachal Pradesh*: Parini (Kulu valley), 2000 m, 15.vi. 1972, B. K. Kaul.

This species can be differentiated from



Figs. 13-23. *Blepharocera alhnicola* sp. nov. ♀: Length 5.70 mm.  
13. Wing; 14. hind leg; 15. middle leg; 16. fore leg; 17. head viewed in front;  
18. antenna; 19. fore claw; 20. middle coxa; 21. ovipositor; 22. hind claw;  
23. middle claw.

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Figs. 24-34. *Blepharocera rahlaea* sp. nov. ♂: Length 6 mm.  
 24. wing; 25. hind leg; 26. middle leg; 27. fore leg; 28. hind claw; 29. antenna;  
 30. head viewed in front; 31. middle claw; 32. genitalia; 33. middle coxal spur;  
 34. fore claw.

*B. autumnalis* Kaul (Kaul 1971) by the absence of stout bristles on the frons, different proportions of antennal and palpal segments and in the structure of genitalia. The species also differs from *B. tertia* Kaul (Kaul 1971) in the proportions of the antennal and palpal segments and different structure of genitalia.

***Blepharocera rahlaea* sp. nov.** (Figs. 24-34)

MALE: 6.00 mm. Body blackish-brown, legs dark brown, wings hyaline, veins brown, halteres stalk pale brown, knob dark brown, Head viewed in front (Fig. 30) oval, width 1.33 the height (excluding the mouthparts). Antenna (Fig. 29) 1.25 the head width, filiform, 15 segments, first segment short, length 0.60 the thickness, the second about 1.70 the first and a little longer than thickness, the third subequal to the second but more slender, the fourth 0.70 the third and as long as thick, fifth to seventh subequal, each a little longer than the fourth, eighth to eleven segments subequal, each a little longer than the seventh, the twelfth and the thirteenth subequal to the seventh, the fourteenth subequal to the fourth but more slender, the fifteenth longest, twice the fourteenth. Eyes contiguous, transversely bisected by a narrow band; the dorsal eye orange, width 1.24 the length, the ventral eye black, oval 1.60 as long as wide, with the ommatidia smaller than on dorsal eye. Rostrum about 0.70 the height of head; labrum narrowly elongate, mandibles absent, palpus clothed with small spines, 5 segmented, first segment stout, as long as thick, second 1.80 the first and twice the thickness, third thrice the second, fourth equal to the third, fifth longest 2.70 the fourth. Wing (Fig. 24): 5.80 mm, 2.75 as long as wide,  $R_{1+2+3}$  ending at 0.90 the wing length;  $R_{1+2+3}-R_4$  cross-vein slightly longer than  $R_5-M_1$  cross-vein;  $M_3$  incomplete 0.22 the length of  $M_1$ ; Cu-An space 0.40 the  $M_4$ -Cu space; anal lobe as far as 6

times the Cu-An space from An. Halteres long reaching the second abdominal segment. Legs long and slender. Fore leg (Fig. 27): femur long and slender, tibia 0.87 the femur, tarsus about 1.20 the tibia, first tarsal segment about 0.50 the tarsus, the second 0.40 the third and subequal to the fifth, claw (Fig. 34) simple evenly slightly curved about 0.75 the fifth tarsal segment. Middle leg (Fig. 26): coxal spur (Fig. 33) present; femur 1.10 the fore femur; tibia about 0.70 the femur; tarsus about 1.30 the tibia, first tarsal segment a little less than 0.50 the tarsus, the second 0.50 the first, the third 0.60 the second, the fourth 0.50 the third and subequal to the fifth; claw (Fig. 31) simple curved and 0.60 the fifth tarsal segment. Hind leg (Fig. 25): longest, femur relatively stout, 1.35 the midfemur; tibia 0.88 the femur; tarsus 0.70 the tibia, first tarsal segment 0.6 the tarsus, the second about 0.3 the first, the third 0.55 the second, the fourth 0.6 the third and subequal to the fifth; claw (Fig. 28) stout, simple, evenly curved, Abdomen 0.7 the body; genitalia (Fig. 32) claspers stout, terminal segments emarginate throughout, clothed with long spines, rest as in figure.

*Holotype* ♂ on slide, INDIA: *Himachal Pradesh*: Rhala (Kulu valley), 3200 m, 5.vi.1972, B. K. Kaul.

This species comes close to *Blepharocera tertia* Kaul (Kaul 1971) but differs in its larger size, different proportions of antennal and palpal segments, and in the structure of genitalia.

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## THREE NEW SPECIES OF GENUS *ISOETES* L. FROM RAJASTHAN, INDIA<sup>1</sup>

C. B. GENA AND T. N. BHARDWAJA<sup>2</sup>  
(With a plate)

Seven species of the genus *Isoetes* have been recorded from India (Pant & Srivastava 1962, Goswami & Arya 1970). The genus is well represented in Rajasthan (Mital 1969, Gena *et al.* 1976, Mishra & Bhardwaja 1978). Taxonomic comparison of Rajasthan material of this genus with the known Indian material and descriptions of species reported since the publication of Pfeiffer's monograph in 1922 (Svenson 1944, Morton 1945, Taylor *et al.* 1975, Rury 1978) has indicated that at least three of the taxa in Rajasthan could be accorded status of new species. The morphological features of these new species are now being described:

***Isoetes rajasthanensis* sp. nov.**  
(Figs. 1-4)

Planta terrestris; rhizomorpha typica 2-lobata; folia 7.5-12 cm longa, filis peripheralibus nullis; labium nullum velum tres-quadranti ad totum sporangium tegens. Megaspores trimorphicae, reticulationibus, 330-350  $\mu\text{m}$ , 250-280

$\mu\text{m}$ , 180-210  $\mu\text{m}$  diam.; megasporae articulatae/connatae plerumque; microspores dimorphicae, laeves, 25-30  $\mu\text{m}$ , 18-22  $\mu\text{m}$  diam.

Plants terrestrial, 7.5 to 12 cm in height (Fig. 1), growing near the margins of streams and on moist soil. Rhizomorph typically 2 lobed (Fig. 2). Leaves 15-39, limb cylindrical, base expanded showing membranous margins, peripheral strands absent. Ligule elliptic with mucilaginous hairs on margins and apex. Labium absent. Velum covering three fourths or almost entire sporangium. Megasporangia elongate (4 x 2 mm) or ovate (3 x 2 mm); sterile cells absent. Megaspores trimorphic, dark brown when wet and white when dry. Megaspores ranging between 330 to 350  $\mu\text{m}$  in diameter. Exine with branched ridges (Fig. 3). Bodily fused megaspores are of common occurrence. Microsporangia rare, elongated (3 x 1.5 mm), microspores dimorphic (Fig. 4), dark brown when wet and creamy white when dry; large microspores 25-30  $\mu\text{m}$  in diameter, small 18-22  $\mu\text{m}$  in diameter, exine smooth.

*Fertile*: July to September.

*Type*: Anadera point, Mount Abu, Rajasthan, India, growing on moist ground near the margins of streams. Collector, C. B. Gena (CBG/I-6, Oct., 1976). Deposited at the her-

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